Collection of Obsolete Residential Electronics

Georgia Department of Community Affairs

Pilot Project Final Report

April, 2003

Introduction

The increasing pace of obsolescence of consumer electronics has driven rising concern about the amount of electronic scrap entering municipal solid waste landfills and incinerators, and the potential this waste stream has to pollute water and air. National studies suggest that the majority of surplused electronic equipment remains in storage and will enter the waste stream in coming years.

At the request of several local governments inquiring about the feasibility of collecting obsolete electronic equipment from their residents, the Georgia Department of Community Affairs, Office of Environmental Management decided to conduct a pilot collection of obsolete residential computers, televisions and videocassette recorders (VCRs) in Georgia. With support from the Solid Waste Trust Fund program, DCA funded Athens-Clarke County and Hall County to hold Georgia's first ever single-day collection event for the collection of residential electronic equipment, and Floyd County to sponsor an ongoing drop-off collection program.

This report summarizes the methods and costs involved in the pilot project, details successes and problems experienced, and makes recommendations to guide future efforts. In conducting the pilot, DCA partnered with local recycling coordinators, local government elected officials and staff, the electronics recycling business community within Georgia, local media, volunteers and charitable organizations. DCA hopes the information gained from the pilot will be useful to other local governments in Georgia interested in providing similar services for their residents.

Background Information and Statement of Goals

Nationally, the issue of what to do with obsolete electronic equipment has sparked debate among environmentalists, businesses, and federal and state governments. The U.S. Environmental Protection Agency is revising its hazardous waste management rules in hopes of removing regulatory hurdles to promote environmentally sound recycling. California and Massachusetts have banned Cathode Ray Tubes (CRTs) from landfill disposal or incineration. During the 2002 Legislative session, Georgia passed House Bill 2, which provides for the creation of a committee to further study the issue. It is estimated that more than 400 businesses in the U.S. deal with electronics recycling in some capacity. Georgia is home to approximately 34 businesses and non-profit organizations handling surplus electronic equipment.

Research from the University of Florida, along with industry sources, indicates that electronic equipment, most notably color CRTs from personal computers and television sets may present a threat to water quality if the lead contained in these devices dissolves into landfill leachate. Additional toxins of note include Brominated Flame Retardants present in the plastic housings of computers, mercury found in batteries, switches and flat screens, and arsenic found in transistors and printed circuit boards. Mercury is of particular note because the biological action in a landfill may convert liquid mercury into its much more toxic methylated vapor form.

There is some dispute about the leaching characteristics of leaded monitors and circuit boards. University of Florida research indicates two-thirds of the color monitors tested fail the federal Toxicity Characteristic Leaching Procedure for contaminant mobility,

regardless of monitor glass particle size. However, well-run Subtitle D landfills may be able to contain this leachate, through their use of liners and leachate collection and treatment systems. In Georgia there is no direct evidence linking groundwater contaminated by lead to landfilled electronic equipment. The Georgia Department of Natural Resources, Environmental Protection Division, monitors groundwater under and around Georgia landfills for 62 constituents, mostly Volatile Organic Compounds. Of the metals required to be tested by the Georgia EPD as part of a landfill groundwater monitoring program, the most commonly found is barium, which is linked with respiratory illnesses in humans and can be harmful to aquatic wildlife. Lead shows up, but not at actionable levels.

In response to these concerns and at the request of several local governments, the Georgia DCA proposed spending $30,000 of Solid Waste Trust Fund dollars on a pilot project to collect obsolete electronic equipment from residences in three communities. A major goal of the pilot was studying the feasibility of conducting residential electronics waste collection events in Georgia cities and counties. Other goals were determining the amount and type of mothballed electronic equipment in the residential sector, the willingness of processors to handle such events, and the logistics involved, including cost. The collection events targeted CRTs (because of the large amounts of lead they contain) and included other electronic equipment associated with TVs and computer monitors such as VCRs, personal computer hard drives and peripherals including mice, keyboards and printers.

Getting Started

The governments of Hall, Floyd and Athens-Clarke counties were selected to participate in the pilot collections based upon their previously expressed interest and successful track record in managing local recycling events. Hall County and Athens-Clarke County each elected to host a single-day collection event and invited local households to register for their event. These events were conducted in November 2001 to coincide with America Recycles Day. Beginning in the fall of 2000, Floyd County used its existing drop-off center to collect electronics on an ongoing basis with little advance promotion and concluded collections at their annual Household Hazardous Waste Collection Event on April 20, 2002. The Rome-Floyd County Recycling Center has ample storage space for stockpiling equipment, but the facility does not have adequate parking space to accommodate a single-day event. When Floyd County conducts their Household Hazardous Waste collection events, they are conducted off-site.

Prior to conducting the events and hiring a contractor to process the electronic equipment collected, DCA staff arranged for facility tours of several Georgia-based electronics recycling companies. The tours helped determine which companies might be interested in handling material gathered from households in a county or city drop-off event. Four companies (MARC 5/R Processing in Lithonia; A&B Recycling in Fort Oglethorpe; GSAN Computer Marketing in Gainesville and U.S. Micro Corporation in Smyrna) were visited by DCA staff and representatives from Hall County, Floyd County and Athens-Clarke County. A fifth company, Creative Recycling of Tampa, Fla., was interviewed. Each company had a different approach to the reuse or recycling of surplus electronic equipment, and the four facilities visited ran the gamut from spacious new warehouse facilities with modern front office space to an old manufacturing facility that had been retrofitted to its current use in

an industrial section of the city. Facility tours included a walk-through of demanufacturing or refurbishment procedures, interviews with management to determine what services they could provide for the collection event, prior experience with similar events, final destination of unusable equipment, and staffing and transportation logistics issues.

DCA staff researched other municipal collection events nationwide, and drafted a sample Request for Proposals (RFP) for the Athens-Clarke County, Floyd County and Hall County governments to adapt and issue. DCA drafted what it felt was a comprehensive document that would protect local governments in the event of conflicts with a selected vendor. The participating governments modeled their RFP on a Cumberland County, PA. RFP for a similar event and used portions of the RFP drafted by DCA. Only one vendor of four (GSAN Computer Marketing, Inc.) that had expressed interest in the pilot bid on each of the events. Attachment F contains the draft RFP prepared by DCA. Copies of the RFPs issued by the pilot communities are available upon request.

Vendor Selection

One of the first criteria the pilot governments and DCA staff wanted assurance of was adequate processing capacity. Staff anticipated participation of approximately one percent of households in each community, with approximately one TV and personal computer per household. This estimate was based on the experience of previous residential collection events held in other communities nationwide as gathered and reported by the U.S. Environmental Protection Agency, regional recycling non-profit organizations, and state and local governments.

The project participants toured the prospective vendors' facilities to get a first-hand look and 'feel' for the operations and legitimacy of each business. As the vendor inspections played out, staff and the pilot communities developed a better sense of what should be expected from a vendor:

- A clean, organized, well-maintained facility
- Professional staff
- Use of proper safety equipment
- A clear description of what happens to the material collected. Is it dismantled in house? Are components sent to other businesses? What do those businesses do with the parts? Are any components exported? Where?
- How much of the material is recycled, and how much is sold for scrap?
- Assurances of environmental compliance and liability insurance
- Willingness to provide references

Vendors should be able to provide detailed instruction on how the material will be collected and transported. Details should include the number of staff the vendor will supply and how materials will be moved around the collection site (pallets, Gaylords, forklifts, etc.), including facility and equipment requirements of the collection event sponsor.

The model RFP in Attachment F identifies many of the requirements a potential vendor should be able to provide. None of the vendors visited had conducted a residential

electronics collection event, though Creative Recycling, who did not yet have a facility in Georgia, had extensive experience with residential municipal collections in Florida. Most vendors were dissatisfied with the prospect of collecting televisions from the general public, and one vendor who had previously expressed interest in participating in the event backed out when that requirement was included as part of the collection programs.

The Pilots

A. Demographics/Existing Solid Waste Management Services

Athens-Clarke County

Athens-Clarke County (ACC), located approximately 70 miles east of Atlanta, is home to the University of Georgia with a student enrollment of about 30,000. The unified government's solid waste management and reduction plan is anchored by a Recovered Materials Processing Facility (RMPF), which was the site of the collection event. A private vendor owns and operates the facility, and ACC owns the property and oversees the operational contract. No Household Hazardous Waste collection programs exist in ACC, but they do conduct an annual scrap tire amnesty week. According to the 2000 census, ACC's population is 101,489 people, or 42,126 households. Land area is just 121 square miles, giving it a population density of 839 persons per square mile, or 348 households per square mile.

ACC provides exclusive solid waste management collection services to 9,000 households and 550 small commercial establishments located within the former city limits of Athens. Households outside the former city limits can self-haul their waste to any of eight drop-off sites or contract with private haulers. Recyclable materials collected are the same as those accepted at the RMPF.

All private haulers must accept all recyclables the RMPF accepts, according to a franchise agreement with Athens-Clarke County. ACC also provides large commercial Dumpster service within the county, and handles approximately 300 customer accounts of this type. Solid waste is taken to the Athens-Dunlap Road Municipal Solid Waste Landfill, a permitted, Subtitle-D facility.

Hall County

Located approximately 50 miles northeast of Atlanta, Hall County has a population of 139,277 people, residing in 51,046 households. The county has a land area of 394 square miles, for a population density of 354 persons per square mile; or 130 households per square mile.

Much of Hall County remains rural, but the southern portion of the county is growing rapidly. Six municipalities offer varying degrees of waste collection service, from no collection service to curbside collection of waste and pre-sorted, commingled recyclables. The Hall County Resource Recovery Center, the site of the collection event, is an integral part of the county's waste management operations. The Resource Recovery Center has not hosted a Household Hazardous Waste collection event, but operators felt the facility was well suited to host a similar single-day collection event for obsolete electronics. Public drop-off bins are available at the center, which uses inmate labor to process commingled plastics, aluminum, and paper. There are an additional 13 drop-off convenience centers

throughout the county. Hall County does not offer curbside collection of recyclables. Solid waste is taken to the Hall County-Candler Road landfill, a county-owned, Subtitle-D facility.

Education efforts consist of brochure distribution, education and monthly recycling rates broadcast on local access television, and having a booth at fairs and exhibits county wide. Also, the center works closely with the local college and school system, conducting tours of the facility.

Floyd County

Floyd County, located in Northwest Georgia, has a population of 90,565 people residing in 36,615 households. With a land area of 513 square miles, there are 177 people, or 71 households, per square mile. The county contains two incorporated cities: Rome and Cave Spring.

The City of Rome and Floyd County jointly fund and operate the Rome-Floyd County Recycling Center, an 11,000-square foot facility and buy-back center located in the City of Rome. Residents can receive cash for recyclable materials, or have their proceeds donated to a charity of their choice. The center runs a commercial recyclables collection route. Unincorporated Floyd County does not provide curbside collection of recyclable material, but it does operate six remote collection sites for household recyclable material, which are taken to the recycling center for processing. The City of Rome and Floyd County jointly operate the Rome-Walker Mountain Road Subtitle D landfill, located southwest of Rome.

B. Event Promotion

Athens-Clarke County

Athens-Clarke County took a comprehensive approach to event promotion. ACC used a water bill insert sent to 30,000 customers, an ad on local cable TV, two newspaper ads and an article in a quarterly newspaper insert, radio advertisements, posters at electronics retailers, and an announcement on the ACC Solid Waste Department Recycling Division Web site. Almost 70% of participants responding to a survey reported learning about the event through the water bill insert. ACC spent a total of $2,839 on promotion and giveaways. The press releases ACC sent to local media resulted in news stories being run in advance of the collection event. The cost breakdown for ACC's promotional activities are as follows:

$511	Local newspaper advertisements
999	Radio ads
164	Posters printing
350	Printing for water bill inserts
215	Keyring giveaway
400	Noteholder giveaways
200	Logo illustration for electronics recycling (used in print ads)
$2,839	Total

Hall County

Hall County used a different media approach to solicit participation. Advertisements ran in the local newspaper, on a local access government TV channel, and on local radio. An article was run in the county employee newsletter and a news release was placed on the county Web site. Radio advertising was found to be the least effective, at a cost of $85 per participant who said they heard of the event through the radio advertisement. Hall County spent a total of $1,524 promoting the event, as follows:

$759	Newspaper advertising
765	Radio advertising
$1,524	Total

Floyd County

Floyd County spent very little money or effort promoting their event. The recycling center periodically receives inquiries from the public about accepting obsolete computers and televisions. The Rome-Floyd County recycling center has plentiful warehouse space, so the staff simply began accepting equipment as the need arose. For this reason, Floyd County's collection 'event' actually took place over a period of many months, beginning in the fall of 2000 and concluding in conjunction with a Household Hazardous Waste collection event in April 2002. The participation of the local community in this program, without the benefit of promotion, indicates there is demand for alternatives to disposal of residential computers and televisions.

C. Single Day Events vs. On-going collections

All three governments had the use of established, well-known recycling centers with loading docks, forklifts, and parking lot space for resident drop-off and staging.

Single-Day Events

Athens-Clarke County held a single-day event on Saturday, Nov. 3, 2001 from 9 a.m. to 1 p.m., available only to ACC residents. To help manage the event and control costs, ACC staff required residents to register their electronic equipment in advance of the event. ACC accepted only TVs, VCRs and personal computer equipment, including peripherals. ACC staff kept a tally of equipment as it was registered for the event, and the associated costs, based on the contractor's price per item.

Athens-Clarke County provided several volunteers to assist with traffic direction, and provided lunch and drinks for contractor's staff, county employees and volunteers. Residents began arriving at 9 a.m., and traffic was fairly constant throughout the event, with a maximum of about a dozen vehicles in line at any one time. Most participants were at the facility less than 10 minutes.

ACC staff met with the contractor prior to their collection event to discuss staging and traffic patterns. Traffic cones were used to mark traffic patterns and allowed for adjustments as the events progressed. The contractor was responsible for unloading up to four vehicles simultaneously and all site operations from the point where vehicles entered the unloading area until they left the unloading area. This was done in part to avoid any claims of County staff or volunteers damaging equipment and vehicles during off-loading

and handling. It was also felt that the contractor's staff best understood the handling and packaging requirements to ensure safe transfer of equipment to their processing facility.

As an example of unforeseen safety concerns, one CRT arrived with the exposed cathode 'gun' protruding from its box. (See photo at left.) Opinions vary on the likelihood of a stored charge injuring a worker or volunteer, but CRTs in this condition should be handled with extreme caution, if only to keep the CRT intact.

Once residents were registered for the event, ACC staff mailed residents a confirmation letter-voucher, along with a survey about the event. By requiring registration, ACC staff was able to screen calls and, only after obtaining the necessary information from the resident, reveal the location of the collection event. ACC staff was concerned that openly publicizing the location of the collection event would make it difficult to control costs since there would be no way to know how much or what type of electronic materials might be brought by area residents.

ACC staff registered 205 residents one week before the registration period ended, enough to exhaust the funding provided by DCA for the pilot. After securing additional funding, within their own budget, ACC was able to accept equipment from an additional 108 residents who had been placed on a waiting list during the final week of registration. Based on national estimates ACC should have expected participation from 420 (1%) households; however, only 217 participants showed up for the actual collection event, which is about half of the number expected to participate in collection events, based on national estimates.

In addition to recycling the electronic equipment accepted, ACC invited local non-profit organizations to provide a "wish list" of electronic equipment their programs needed. Staff then checked these "wish list" items as residents called in to register their equipment for drop-off at the collection event. Seventeen local non-profit organizations received at least some of the items they requested.

Like ACC, Hall County registered participants before its event, held on Saturday, Nov. 17, 2001. Registration began Oct. 8 and ended Nov. 1. Available funding remained after the close of registration, so Hall County continued registering participants until all funds awarded by DCA were obligated. Residents called in to register for the event, and county staff mailed confirmation cards one week prior to the event. In this way, the confirmation cards also served as a reminder for the event. Having a firm grasp of the type and quantity of equipment collected was extremely important for Hall County, as it had no additional funds to pay for processing of items beyond what the awarded amount would cover. Hall County used only county staff the day of the collection event, and did not provide lunch.

At the ACC event, arriving residents were greeted by a volunteer, who directed them behind the

Recovered Materials Processing Facility (RMPF). Since the unloading was conducted behind the RMPF and was out of sight to arriving residents, it was important to have a greeter. Also, a large banner was placed on the road outside the collection site to direct citizens to the collection point. Hall County's collection was located near the road in front of the RMPF, so a greeter was not used.

Material Handling

On-site material handling was similar at both single-day collection events. The contractor was responsible for most of the material handling, except for some limited volunteer and county staff assistance. However, at the Hall County event, county staff were largely on their own during a 30-minute period when the contractor transported a truckload of material to its facility, approximately one mile away. Because GSAN is located within one mile of the collection site, GSAN chose to use smaller trucks and make two trips. Proximity of the collection site should be a consideration when choosing a vendor and negotiating transportation logistics.

For Hall County's event, vehicles were directed to unloading lanes in front of the RMPF. As part of registration, residents were given a time slot (9-10 a.m., Noon-1 p.m., etc.) in an attempt to avoid a 'rush' of activity. Arriving vehicles were directed into one of two parallel lanes for unloading. In most cases, this process went smoothly. However, as traffic increased periodically throughout the day, there were instances when contractor's staff unloaded equipment before it could be verified against what was registered. County staff and volunteers attempted to check off materials as they were delivered. There were instances when participants brought fewer or more items, mostly more, than they had registered. Staff attempted to balance the two, based partly on the cumulative tally being kept and partly on 'gut' feeling.

For the ACC collection event, arriving vehicles were directed into one of three parallel lanes behind the RMPF. Material was loaded onto carts and transferred to pallets. Full pallets were moved with a forklift (provided by ACC) into a 54-foot trailer using a loading dock at the RMPF. A 20-foot box truck was dedicated to console televisions, which proved essential due to the unwieldy and dissimilar size of the console televisions.

Additionally, a passenger-style cargo van was loaded with equipment the vendor knew to have significant re-use value. In Hall County, because the recycling center was located approximately one mile of GSAN's offices, GSAN used only a box truck and passenger-

style cargo van with flatbed trailer attached. Instead of a forklift, a pallet-jack was used to load full pallets into the truck.

At both events, material was loaded onto wooden pallets arranged between the drop-off lanes and the trucks. A pallet was dedicated for each of the following materials: personal computer monitors, hard drives, VCRs, and printers/scanners. Peripherals and keyboards were loaded into large cardboard boxes; original manufacturer boxes were ideal for holding dozens of keyboards. Cabling was left attached and wound around its respective equipment or secured with tape guns. Cabling presented one of the more obvious hazards to the collection event; it was easy for staff and volunteers to trip on cables dangling from large, heavy pieces of equipment as they moved among pallets. This danger was lessened by the use of wheeled carts that could be moved among vehicles, reducing the number of trips to the pallet staging area.

Loaded pallets were stacked and shrink-wrapped to avoid tipping. Monitors were placed face down on a cardboard-lined pallet, nine to a layer. In most cases, similar-sized monitors could be used to make a stable layer. Each layer was topped with a sheet of cardboard, and each pallet was stacked four high, then shrink-wrapped. Care was taken to prevent screens from rubbing against each other; large console televisions were packed so that screens were not facing each other, or cardboard was placed between the screens.

A pallet was also designated for flattened cardboard boxes. Equipment often arrived in large cardboard boxes, in some cases the box the computer was originally packed in. These boxes proved ideal for layering pallets, and the excess was simply recycled at the collection center. Another essential staging tool was a Gaylord or large container for trash. A large amount of packing material, books and other material the vendor could not accept was dropped off. In the case of VCRs, the vendor attempted to keep manuals and remote controls with their respective equipment.

Ongoing Collection

Floyd County opted for an ongoing collection strategy, in part because the recycling center received inquiries about electronics recycling on a regular basis. Material was accepted from residents before the November collection events in Hall and Clarke counties, and continued to be collected until April, 2002.

When truckload quantities of televisions and personal computers were accumulated, Floyd called the vendor for pickup. Staff was able to keep track of costs by comparing the per-unit processing costs provided by the vendor against remaining grant funds. Since Floyd

County did not have a single-day event, materials were handled with existing staff, which is partly made up of prison labor. Materials were stored until collection, stacked on pallets and shrink-wrapped as with the collection events.

Like ACC, Floyd County sought interest from local non-profits who might be able to use collected equipment. To compile working systems, these organizations needed volunteers willing to go through collected equipment, refurbish what they could and load appropriate software. Two local non-profits were able to assemble 16 functional computer systems.

D. Results

The pilot collected 597 televisions, 537 computer monitors and 313 Central Processing Units (CPUs.) Weights of the material collected were unavailable, as the contractor charged per unit. However, using weight estimates provided by a private electronics remanufacturer and recycler in Massachusetts, the following estimates were generated for comparison with similar programs in the nation.

Computer Monitor:	30 pounds
Television:	42 pounds (15'-21")
Console Television:	125+ pounds

Using these estimates, the pilot collected 10.8 tons of televisions, 4.4 tons of console televisions and 8 tons of computer monitors. These totals do not include the VCRs that were collected at the Athens-Clarke County and Hall County events, or the weight of the keyboards, CPUs and other peripheral computer equipment that was collected. Though not a stated goal of the pilot, another benefit was the removal of 1,134 CRTs, containing an estimated 2,835 pounds of lead, from entering local landfills.

Processing Costs

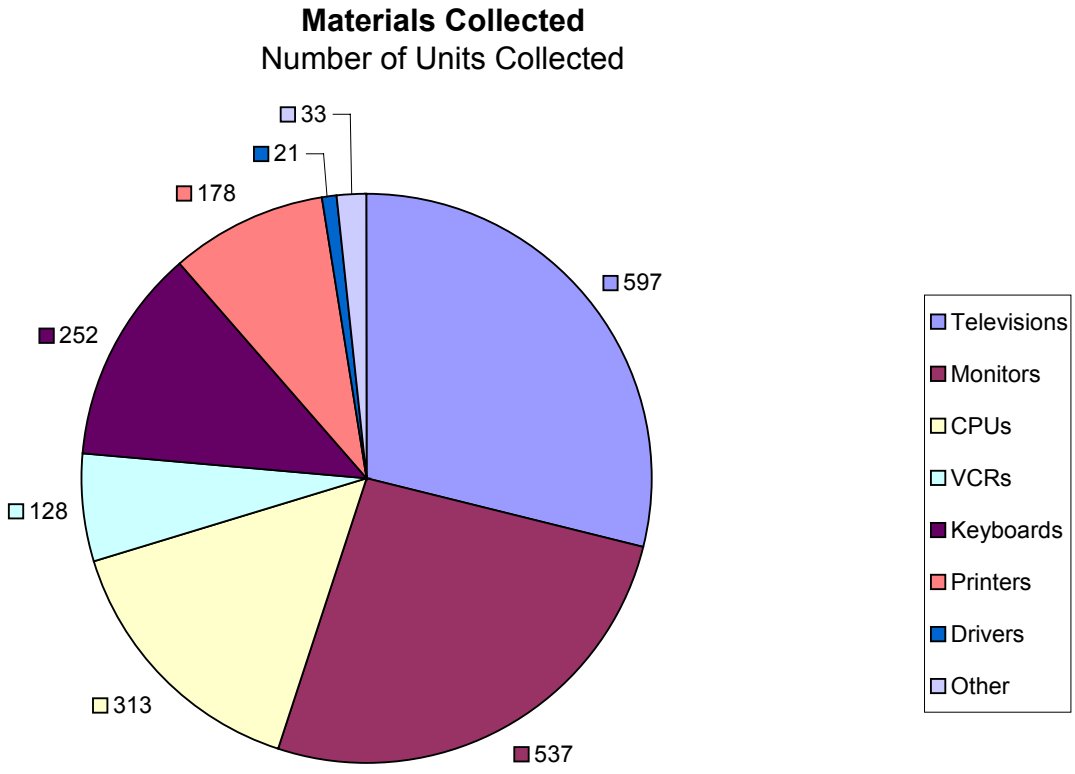
Processing costs for computer monitors and TVs are estimated at $805[1] per ton, as noted in the following table. This is substantially higher than other events conducted nationwide, although direct comparisons are difficult to make given the unique aspects of each collection event. For example, the State of Massachusetts, which enacted a ban on landfill disposal of CRTs in April 2000, has a statewide contract with a processor for $300 per ton for loads of electronic equipment. The average per-ton cost for events conducted across the U.S. is approximately $330 per ton. Many programs charge participants a per-unit fee for dropping off equipment to lower operating costs; the Georgia pilot did not. Also, the cost-per-ton calculation ignores the VCRs and other peripherals that were accepted at the events, and the costs to promote the event. Vendor staffing at the collections is included in the per-unit and per-ton costs, but local government employee staffing is not.

Item	Processing Cost	Cost per ton[1]
Televisions (@ $15 per unit)	$8,595	$714
Computer monitors (@ $15 per unit)	8,055	1,000
Console TVs (@ $30 per unit)	720	480
Total	$17,370	$805

[1]Cost-per-ton calculations are rough estimates, for comparison to other programs, which are often quantified by cost-per-ton. Total cost per ton was derived by dividing total cost by total estimated weight in pounds, and multiplying by 2,000. The cost-per-unit figures in this report are more accurate reflections of processing costs.

A table of actual processing costs paid to the vendor follows:

Equipment type	Athens-Clarke County	Hall County	Floyd County	Total Collected	Processing Cost	Total Processing Cost
Monitor	129	211	197	537	$15	$8,055
Small TV	133	132	308	573	$15	$8,595
Large TV	N/A[2]	N/A[2]	24	24	$30	$720
CPU	115	115	83	313	$9	$2,817
VCR	85	43	N/A[3]	128	$9	$1,152
Keyboard	102	87	87	276	$4	$1,104
Printer	78	80	43	201	$3	$603
Hard drive	11	2	0	13	$3	$39
Zip/tape drive	9	1	0	10	$3	$30
Laptop	8	2	0	10	$8	$80
Modem	5	0	0	5	$5	$25
Printed Circuit Board	9	8	0	17	$1	
Scanner	6	1	0	7	$3	$21
Power Supply	0	2	0	2	$1	$2
Totals	690	684	742	2,127	$112	$23,243



E. Expenditures

Athens-Clarke County

Cash expenditures for the ACC event totaled $10,966. Using the actual cash outlay, the average total cost per participant was $50.53. ACC received 690 electronic items, 262 of which were CRTs (133 television sets and 129 computer monitors.) Average processing cost per item was $11.97. The total average cost per item, including promotion and in-kind staff contribution, was $25.37. This includes large and small televisions, videocassette recorders, personal computer monitors, central processing units, keyboards, and peripherals.

Actual and In-kind Costs

Advertising promotion	$2,839
Processing/ Collection	8,260
ACC Staff	6,338
Supplies	67
Total Cost	$17,504

[2]Athens-Clarke County and Hall County did not distinguish between large and small televisions, and were charged the same rate.
[3]Floyd County did not accept VCRs at its ongoing collection event.

Hall County

Cash expenditures for the Hall County single-day collection event totaled $8,180, all of it funded by DCA. Using the actual cash outlay, the average cost per participant was $58.99. Hall County received 684 items, including 343 CRTs (132 TVs and 211 monitors.) Average processing cost per item was $11.06. Average total cost per item, including promotion and in-kind staff contribution, was $18.88.

Advertising promotion	$1,524
Processing/ Collection	7,693
County staff	3,212
Give-away key chains	694
Total Cost	$13,123

Floyd County

Floyd County spent a total of $9,777 to process personal computer equipment and televisions collected between late summer of 2001 and May 1, 2002. All costs were funded by DCA. Floyd County received 742 items, including 529 CRTs (332 TVs and 197 monitors.) Average processing cost per item was $13.18. Average total cost per item was $13.18. Participants were not counted. It is important to note that Floyd County's costs cannot be directly compared to the collection events for two reasons: Floyd County spent no funds on promotion, extra equipment or supplies, and they did not collect VCRs from the public for processing.

F. Problems encountered/Recommendations

Vendor Selection

- The most substantial problem the pilot collection events uncovered was a lower than expected response from potentially interested vendors. Of several vendors who expressed interest in participating in the pilot, only one bid on the collection events. It is believed that some vendors were put off by the rigorous Request for Proposals, the inclusion of televisions (which have a high cost to accept and little reuse potential), or both. Simplifying the RFP might result in more bids and consequently better rates for local governments. However, GSAN Computer Marketing thought accepting large, console televisions was more of a deterrent to other vendors. The president of GSAN said most vendors were simply not set up to accept the variety of equipment that results from a residential collection. He indicated he would increase his rate for accepting large console TVs at any subsequent event, due to high labor costs in dismantling them.

Event Promotion

- ACC staff was overwhelmed by the amount of time spent on the telephone registering residents for the drop-off event. Staff spent a combined 290 hours to orchestrate and host the event, and the majority of that was spent on the phone. ACC reported that the nature of the conversations indicated ACC did not adequately explain to the public why registration was needed. If ACC hosts future events, they will set up registration online. An online form could be sent to a staff member who could in turn confirm the registration, enter it onto a log sheet, and mail the resident a voucher and other

pertinent information. They would also either dedicate a staff member or intern to answer phones during the registration period or plan the event during the summer months so it does not conflict with other projects. ACC staff insists on registering participants, but would want to streamline the process.

Single-Day Collection Events

- At the single-day events, having participants walking around lanes of traffic posed safety concerns, both from other vehicles and for staff moving heavy equipment. It was impossible to politely convince participants to remain in their cars. Reasons for this may include simple curiosity, a desire to explain what equipment the resident was bringing and why, or fear of theft or accidental recycling of material (in the trunk or other area of the vehicle) which was not intended for drop-off. Having staff discuss surveys or having drivers complete surveys while in line may help keep participants in their vehicles.
- Some drivers arriving to drop off materials will get confused, no matter how carefully traffic patterns are delineated. There is no substitute for having staff on hand to direct drivers into and out of the staging area. Multiple, parallel lanes also allow for getting around unforeseeable events like cars stalling in the middle of the unloading area. One lane of vehicle traffic was blocked for more than an hour at the ACC drop-off site when a resident's dog locked itself inside a car, with the engine running. This incident underscored the importance of trying to convince people to stay in their vehicles, and the need for multiple, parallel drop-off lanes.
- Many of those who registered to bring equipment to the Athens-Clarke County event failed to show. Waiting until one week prior to the event to send out participant information may reduce the number of no-shows.
- The most difficult aspect for Hall County staff was matching what was registered against what was actually delivered. Equipment would often be unloaded before staff could review delivered items against registered items. This made it very difficult to keep accurate records of what was received, which was important not only for the purposes of having accurate results from the pilot program, but also for staying within budget. Adequate staffing is essential to ensure verification of materials delivered against materials registered. A method for keeping a running total is needed to ensure an accurate count, both for reporting and financial purposes. If the local government chooses not to accept unregistered equipment, a policy decision must be made to enforce collection of registered equipment only. Some organizers feared such a policy could lead to roadside dumping of equipment.
- The Hall County event was understaffed for approximately 30 minutes when the contractor left the site to drop off a load of collected equipment at its facility. Contractor and staff should remain on-site at all times.
- Consider providing a tax donation form, if appropriate. A few residents asked if ACC staff could provide a tax donation form for their donation of electronics, if they were being donated to charity.
- Address senior citizen (or homebound) needs. A small number of residents contacting the office to register for the event did not have a way to deliver the materials.

- Assure the public that the materials collected will be recycled, reused or responsibly disposed of, as promised. News reports of 'midnight dumping' by solid waste companies and a general distrust of government by some make it imperative that the local government hosting the collection event ensures materials are properly managed.

Ongoing Collection Event

- Floyd County reported the fewest problems with its approach. However, staff noted residents may expect ongoing acceptance of televisions and computer equipment, while the local governments must decide whether they want to continue funding this activity.
- The choice of conducting a single-day collection event or conducting an ongoing collection event is determined in part by the recycling center's infrastructure. A facility with a lot of warehouse space, but not much space for routing traffic for drop-off of equipment, would benefit from an ongoing collection strategy. However, a facility with little storage space but adequate parking and maneuvering room for vehicles would benefit from a single-day collection event. The Georgia Environmental Protection Division allows a local government to accumulate residential household electronics to be recycled without being considered a hazardous waste generator and consequently subject to federal waste-handling standards. However, this exemption does not extend to local governments collecting electronic equipment from businesses.

  (See Attachment A: Ga. DNR Regulatory Interpretation)

Budgeting

- Having the contractor base the processing fee on a per-unit basis helps local governments track costs, and gives them a comfort zone for when funds have been expended. However, the contractor charged for every item processed; in other municipal collection events conducted nationwide, the contractors gave a credit for certain items, such as modern hard drives, keyboards and laptop computers. Also, tracking material and costs by unit rather than weight makes it difficult to compare local results to other national studies, many of which are quantified by weight. Suggestions for controlling costs include:
  - Restrict or eliminate the collection of televisions
  - Simplify the RFP, but still limit local government's environmental liability and exposure, as well as ensure volunteer and worker safety.
  - Charge residents a user fee. Most residents said they would not object to paying $5 or less to have their surplus electronic equipment properly recycled.
  - Explore no-cost or low-cost methods of promotion. Advertising on local radio provided the lowest participant rate for dollars spent.
  - Partner with a local business, such as an electronics retailer, to help defray promotional expenses.
  - The vendor's labor costs could be reduced by relying more heavily on volunteers. While the vendor must be on site to supervise, most of the work is heavy lifting, and requires little expertise.

    - Adding a line item in the RFP for credits for valuable components, such as modems, hard drives, etc.

- Explore other alternatives to conducting collection events for surplus electronic equipment from the residential sector. Some large computer manufacturers offer take back services for personal computer equipment. Local governments may consider this approach, which may prove more convenient. Original manufacturers of computers tend to not accept televisions, but in some cases they do accept any brand or year of personal computer equipment.
- Hewlett-Packard's Product Recycling Solutions division offers two options that could be considered for municipal collection. For $21 per unit (hard drive, processor, keyboard, but no monitor) they will pick up any brand of personal computer equipment from the resident's doorstep. This option is only available for 10 or fewer units.

(See Attachment B: Collection Alternatives)

G. Summary

Nationally, local electronics collection events are gaining popularity, though they are not commonplace. A survey by the Northeast Recycling Council, Inc. (NERC) released in October 2001 found that there had been approximately 500 collection programs by that time, including single-day events and ongoing collections. The number has grown since. Most of the programs began since 1998, and most collection programs have been open to small businesses. Computer monitors are collected in 96% of the programs, while TVs are collected in only 77%, due to their higher processing costs. The study found that an average of 118 pounds of material is collected from each vehicle attending a collection program. The cost to recycle computers and their peripherals, including monitors, averages about $330 per ton. The range varies widely however: from $20/ton in Indiana to more than $1,100/ton in Iowa and Pennsylvania. Residents paid user fees, typically $5 per unit, in 42% of the programs surveyed. A more detailed description of other programs and results can be found in Attachment B: Other Electronics Collection Program Results.

Each community participating in the Georgia pilot was awarded up to $10,000 for the collection, processing, or promotion costs associated with collecting electronic equipment. Both of the single-day events were well received in the communities, with many participants commenting that they had wondered what they should do with the old equipment. No fees were charged to residents, though surveys indicated most (51%, according to Hall County's survey results) would be willing to pay a small fee, and 47% would be willing to pay $5 per unit. The average processing cost for the pilot was $10.93 per unit. For the most expensive equipment (TV and monitors), a processing fee of approximately $805 per ton was charged. Nationally, collection programs have ranged from vendors paying local governments for materials collected to charging them up to $1,100 per ton.

The decision to hold a single-day event, ongoing collection, or other method of collection is best made by the local government. They are most familiar with their logistical capabilities, and the needs of their residents. The NERC report found certain types of collection programs are more effective in certain demographics. For more details from the NERC report, see Attachment C: Other Electronics Collection Program Results.

Curbside collection programs tend to serve smaller population areas, while special event and ongoing drop-offs are better suited for larger population areas. Nationwide, 45% of collection programs were special events and 47% were ongoing collection programs.

Hall County and ACC reported participation rates slightly below the national average. The NERC study found that on average, 1% of households would participate in an electronics recycling collection event. In Hall County, approximately 0.3% of households participated and in ACC, approximately 0.5% of households participated. Floyd County did not track participants. It should be noted that the number of items collected was effectively capped by the grant amount of the pilot. However, general conclusions can be drawn from the number of participants in these "first-time events" based upon the level of promotion done by both ACC and Hall County.

Taking a moderate approach to event promotion appears advisable, especially given processing costs. ACC staff felt they could have saved money by not buying as much advertising and giveaways for participants. ACC took advantage of water utility bills to carry their message, spending only $350 in printing costs to publicize the event. Nearly 70% of participants responding to a survey reported hearing about the collection through the water bill inserts. Hall County reported the least effective results were through radio advertising, and recommended exploiting as much low-cost advertising media as possible, such as the county's Web site, utility bill inserts and public service announcements on local-access TV.

The pilot showed that collecting obsolete or unwanted electronic equipment from Georgia households is logistically feasible, assuming funds are available. Processing costs for electronic equipment were expensive. While some dislike the thought of landfilling computer equipment and old television sets, Georgia's $32 per ton average Municipal Solid Waste tipping fee is tempting compared to the estimated $805 per ton paid for recycling or reuse of monitors and televisions collected at the pilot collection events. Even the more favorable national average of $320 per ton for recycling residential computer equipment is ten times Georgia's average tipping fee. Area hazardous waste landfills quoted prices comparable to the cost of the collection events, though the rates appeared to be quite flexible.

In another effort to determine the scope of the electronics disposal issue in the state, DCA hired R.W. Beck to survey Municipal Solid Waste landfills across Georgia. The survey, completed by 36 of 47 landfills surveyed, indicated they received electronics mixed with other loads. None of the larger facilities reported receiving source-separated loads of electronic equipment. In fact, they reported a policy of rejecting any source-separated loads of electronic equipment. In Georgia, 73% of the MSW enters 12 of the state's 51 MSW facilities. This suggests very few source-separated loads of electronics are being disposed of in Georgia. Only 14 out of 47 survey respondents reported an increase in electronics being disposed, and field observations by R.W. Beck in other states found "electronics are not readily observable in incoming loads."

Hopefully, with a better understanding of what to expect from Georgia communities, more vendors will participate in future events and drive down the costs of subsequent collections. Charging a fee for the collection, which many participants said they would be

willing to pay, would also help lower costs to local governments. It also appears fewer funds could be spent on promotion, especially in light of Rome-Floyd County's success generating public response with no publicity. However, local recycling coordinators best know their constituents, and can draw on their own local experience in spreading the word about an upcoming or ongoing program.

The pilot showed that there is not an enormous logistical burden to hosting a single-day or ongoing collection event for household electronics. Getting the word out to the community and defining exactly what will be accepted is crucial, and there are some basic equipment needs (forklifts, pallets, shrink-wrap, wheeled carts for unloading vehicles) as well as some facility needs (loading docks are helpful, and room for unloading several vehicles at once is crucial for single-day events) depending upon the type of collection program implemented.

It will remain the local government's responsibility to assess the viability of collection events, or assess other alternatives to disposal of residential electronic equipment. Whether the costs of hosting a collection event to remove unwanted electronic equipment from the local waste stream might be better spent on other waste reduction or recycling activities will remain up to local governments to decide for the foreseeable future. The electronics recycling industry has a strong presence in Georgia (See Attachment D: Potential Electronics Collection Vendors in Georgia), and new innovations will almost certainly appear as this issue continues to receive national attention.